

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) **27 DECEMBER 2004 (27.12.2004)**

Applicant's or agent's file reference

PCT04-044

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/KR2004/002450

International filing date (day/month/year)

23 SEPTEMBER 2004 (23.09.2004)

Priority date(day/month/year)

02 OCTOBER 2003 (02.10.2003)

International Patent Classification (IPC) or both national classification and IPC

IPC7 F28D 15/02

Applicant

LG Cable Ltd. et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/002450

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-13	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-13	NO
Industrial applicability (IA)	Claims	1-13	YES
	Claims		NO

2. Citations and explanations :

Reference is made to the following documents:

D1: JP 2000-161878 A

D2: JP 2003-179189 A

D3: JP 61-66086 A

D4: KR 10-0290461 B1

Claims 1-13 are considered to lack an inventive step for the following reasons:

Claim 1 relates to a flat plate heat transfer device comprising: a thermal-conductive flat case, one layer of mesh installed in the flat case and configured so that wires are woven to be alternately crossed up and down, wherein a dispersion channel of a vapor is formed along a surface of the wire from a cross point of the mesh near a heat source, and a flow channel of a liquid is formed by means of a capillary phenomenon along a length direction of the wire from a mesh lattice near a heat emitting unit to a mesh lattice near the heat source.

D1 discloses a planar heat pipe to cool heat generating components in various electronic apparatuses efficiently by arranging a mesh wick layer comprising at least a sheet of mesh wick in a housing having upper and lower plates composed of a foil or a thin plate and encapsulating a working fluid in the housing.

D2 discloses a thin heat sink, and its packaging structure, suitable for cooling heat generating bodies, e.g. electronic components or optical components, mounted with high density.

D3 relates to a heat pipe which has no reversible heat transfer characteristic and which is capable of transferring heat only in one direction, by the provision of a wick made of a shape memory alloy.

(Continued on Supplemental Sheet.)

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of :

Box V.

D4 relates to a heat pipe having braiding wick structure to improve performance by increasing capillarity with simple structure, and to simplify the manufacturing process by forming a wick with a braiding wire spirally in the heat pipe.

Following are comparisons between the present application and D1 which is considered to be the closest prior art:

The present application is the same as D1 in that one layer of mesh configured so that wires are woven to be alternately crossed up and down is placed between upper and lower plates. The dispersion channel of a vapor and the flow channel of a liquid of the present invention are anticipated from the one-layered crossed mesh of D1, and no particular difference in the operational effect is acknowledged for the present invention.

Claims 2-4 limit the numerical values of the diameter of the mesh of claim 1 and the height of the flat case of claim 1. Said numerical values are not considered to have any critical effect.

Claim 5 defines the flat case of claim 1 as consisting of an upper plate and a lower plate, which is already shown in Figs. 1 and 2 of D1.

Claim 6 limits the direction of a lengthwise wire of claim 1: the direction of the lengthwise wire is the same as the direction of the heat transfer. Said feature of the wire is considered to be obvious to a person skilled in the art.

Claim 7 limits the material of the flat case of claim 1: the flat case is made of electrolytic copper foil, and the inner side of the case is formed of prominences and depressions of the electrolytic copper foil. It would be obvious to a person skilled in the art to derive said material of the flat case from D1 in which the upper and lower plates are made of copper.

Claims 8-11 limit the materials of the mesh or case. Copper among said materials is the same as the material shown in D1.

The method for sealing the flat case according to claim 12 is considered to be a commonly used method.

The kinds of refrigerants according to claim 13 are considered to be commonly used kinds of refrigerants.

Therefore, the subject matter of claim 1 and its dependent claims 2-13 does not meet the requirement of inventive step.